CLAIMS

What is claimed is:

1. An adhesive composition comprising:
a semi-crystalline copolymer of propylene and at least one comonomer selected from the group consisting of ethylene and C_4 to C_{20} α-olefins having a propylene content of greater than 65 mole percent;
wherein the copolymer has a weight average molecular weight (Mw) from about 15,000 to about 200,000; a melt index (MI) from about 7 dg/min to about 3000 dg/min as measured by ASTM D 1238(B); and a weight average molecular weight/number average molecular weight ratio (Mw/Mn) of approximately 2.

2. The adhesive composition of claim 1 wherein the semi-crystalline copolymer has a propylene content greater than 73 mole percent.

3. The adhesive composition of claim 1 wherein the semi-crystalline copolymer has a melt index of from about 20 dg/min to about 900 dg/min as measured by ASTM D 1238(B).

4. The adhesive composition of claim 1 wherein the semi-crystalline copolymer has a random comonomer sequence distribution.

5. The adhesive composition of claim 1 wherein the semi-crystalline copolymer comprises a heat of fusion from about 30 to about 80 J/g as determined by DSC.

6. The adhesive composition of claim 1 wherein the semi-crystalline copolymer comprises isotactic polypropylene sequences

7. The adhesive composition of claim 1 wherein said composition is a hot melt adhesive.

8. The adhesive composition of claim 1 further comprising a wax.

9. The adhesive composition of claim 1 further comprising at least one or more additives selected from the group consisting of a tackifier, an antioxidant and combinations thereof.

10. The adhesive composition of claim 1 wherein the semi-crystalline copolymer has a weight average molecular weight (Mw) of from about 50,000 to about 150,000.

11. The adhesive composition of claim 1 having a melt viscosity of less than 10,000 cps measured at 180°C.

12. An adhesive composition comprising:

a.) from about 5 to about 95 weight percent of a semi-crystalline propylene copolymer having a propylene content greater than 65 mole percent;

b.) from 0 to about 80 weight percent of a tackifier;

c.) from 0 to about 60 weight percent of a plasticizer;

d.) from 0 to about 50 weight percent of a wax; and

e.) from 0 to about 5 weight percent of an antioxidant;

wherein the sum of the components (b), (c), and (d) comprises from about 5 to about 95 weight percent of said adhesive composition.

13. The adhesive composition of claim 12 wherein the propylene copolymer comprises a semi-crystalline copolymer of propylene and at least one comonomer selected from the group consisting of ethylene and at least one C_4 to C_{20} α-olefin having a propylene content of greater than 65 mole percent.

14. A process of producing an adhesive composition comprising:

a) reacting propylene and at least one comonomer selected from the group consisting of ethylene and C_4 to C_{20} α-olefin, under polymerization conditions in the presence of a metallocene catalyst capable of incorporating the propylene sequences into isotactic or

syndiotactic orientations, in at least one reactor to produce a first copolymer having at least 65 mole % propylene and wherein at least 40% of the propylene sequences are in isotactic or syndiotactic orientations; and

b) optionally, adding a tackifier;

wherein the copolymer has a melt index (MI) from about 7 dg/min to about 3000 dg/min.

15. The process of claim 14 further comprising:

a) reacting propylene and at least one comonomer selected from the group consisting of ethylene and C_4 to C_{20} α-olefin, under polymerization conditions in the presence of a metallocene catalyst capable of incorporating the propylene sequences into isotactic or syndiotactic orientations, in another reactor or subsequent reactors, to produce a second copolymer having at least 65 mol % propylene wherein at least 40 mol % of the propylene sequences are in isotactic or syndiotactic orientations and;

b) combining the contents of the first reactor with the contents of the subsequent reactors to form a blend, and;

c) recovering the blend of step (d), and;

d) optionally adding a tackifier at any time in the process.

16. The process of claim 14 wherein the copolymer comprises a semi-crystalline copolymer of propylene and at least one comonomer selected from the group consisting of ethylene C_4 to C_{20} α-olefin having a propylene content of greater than 73 mole percent.

17. An article of manufacture comprising the adhesive composition of claim 1.

18. The article of manufacture of claim 1 wherein the article of manufacture is a sanitary article.

19. An adhesive composition having an MFR greater than about 250 dg/min. at 230NC, the composition comprising a random copolymer produced by copolymerizing propylene and at least one of ethylene or alpha-olefin having 20 or less carbon atoms, the random copolymer having a crystallinity at least about 2% and no greater than about 65% derived from stereoregular polypropylene sequences and a melting point of from about 25NC to about 105NC.

20. An adhesive composition comprising the reaction product of a free radical initiator and a random copolymer produced by copolymerizing propylene and at least one of ethylene or alpha-olefin having 20 or less carbon atoms, the random copolymer having a crystallinity at least about 2% and no greater than about 65% derived from stereoregular polypropylene sequences and a melting point of from about 25NC to about 105NC.

21. The adhesive composition of claim 19 additionally comprising an ingredient selected from the group consisting of tackifiers, waxes plasticizers, colorants, antioxidants and fillers.

22. An adhesive composition formed by treating a polymer composition in the melted state with a free-radical initiator in an amount effective to increase the MFR at 230NC by at least 100%.

23. The adhesive composition of claim 19 in which the adhesive composition is in the melted state.

24. The adhesive composition of claim 19 in which the free radical initiator comprises a peroxide.

25. The adhesive composition of claim 19 in which the free radical initiator comprises 2,5-bis(tert-butylperoxy)-2,5-dimethyl-hexane.

26. The adhesive composition of claim 19 in which the free radical initiator comprises a diazo compound.

27. The adhesive composition of claim 19 in which the composition is both degraded through chain scission and crosslinked, wherein the extent of degradation through chain scission is greater than the extent of crosslinking.

28. The adhesive composition of claim 19 having a molecular weight distribution between about 1.8 and 5.0.

29. The adhesive composition of claim 19 in which the ethylene or alpha-olefin has a narrow composition distribution.

30. The adhesive composition of claim 19 in which the random copolymer is a branched random copolymer.

31. The adhesive composition of claim 19 in which the random copolymer includes from at least about 5 mole% to no greater than about 35 mole % ethylene units or alpha-olefin units having 20 or less carbon atoms.

32. The adhesive composition of claim 19 in which the random copolymer includes more than about 65 mole % propylene units.

33. The adhesive composition of claim 19 having an MFR of at least about 500 dg/min. at 230NC

34. The adhesive composition of claim 20 in which the free radical initiator used to form the reaction product is in the amount of at least about 0.25 wt% and no greater than about 5.00 wt%, based on the weight of the random copolymer.

35. The adhesive composition of claim 20 in which the free radical initiator used to form the reaction product is in the amount of at least about 0.50 wt% and no greater than about 3.00 wt%, based on the weight of the random copolymer.

36. The adhesive composition of claim 19 in which the adhesive composition is a blend that comprises a crystalline polymer blended with the random copolymer.

37. The adhesive composition of claim 19 in which the adhesive composition is a blend that comprises a crystalline polymer blended with the random copolymer, wherein the crystalline polymer has a melting point greater than about 110NC.

38. The adhesive composition of claim 19 in which the adhesive composition is a blend that comprises a crystalline polymer blended with the random copolymer, wherein the crystalline polymer comprises polypropylene or a copolymer comprising propylene units and at least one comonomer selected from the group consisting of ethylene or C4-C20 alpha-olefins, the copolymer having a comonomer content of less than about 15 mole%.

39. The adhesive composition of claim 36 in which the crystalline polymer comprises isotactic polypropylene.

40. The adhesive composition of claim 36 in which the crystalline polymer comprises isotactic polypropylene having a melting point greater than 110NC.

41. A process for making a degraded adhesive composition, comprising: (a) providing a first polymer composition having an MFR less than 250 dg/min. at 230NC. and comprising a random copolymer produced by copolymerizing propylene and at least one of ethylene or alpha-olefin having 20 or less carbon atoms, the random copolymer having a crystallinity at least about 2% and no greater than about 65% derived from stereoregular polypropylene sequences

and a melting point of from about 25NC to about 105NC; and (b) contacting the first polymer composition, in the melted state, with a free radical initiator, to provide a second polymer composition, where the second polymer composition has an MFR greater than 250 dg/min. at 230NC.

42. The process of claim 41 in which the first polymer composition has an MFR less than 50 dg/min. at 230NC. prior to contacting the first polymer composition with the free radical initiator.

43. The process of claim 41 in which the free radical initiator comprises a peroxide.

44. The process of claim 41 in which the free radical initiator comprises 2,5-bis(tert-butylperoxy)-2,5-dimethyl-hexane.

45. The process of claim 41 in which the free radical initiator comprises a diazo compound.

46. The process of claim 41 in which the first polymer composition or the second polymer composition, or both, additionally comprises a crystalline polymer blended with the random copolymer, wherein the crystalline polymer has a melting point greater than about 130°C.

47. The process of claim 41 in which the first polymer composition or the second polymer composition, or both, additionally comprises a crystalline polymer blended with the random copolymer, wherein the crystalline polymer comprises polypropylene or a copolymer comprising propylene units and at least one comonomer selected from the group consisting of ethylene or C4-C20 alpha-olefins, the copolymer having a comonomer content of less than about 15 mole%.

48. The process of claim 41 in which the first polymer composition is fully melted in the presence of the free radical initiator.

49. The process of claim 41 in which an effective amount of free radical initiator is contacted with the first polymer composition.

50. The process of claim 41 in which the free radical initiator is present in an amount sufficient to increase the MFR of the first polymer composition by at least 100% to form the second polymer composition.